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SCIENCE AND TECHNOLOGY

U.S. SEEKING JAPANESE 'STEALTH' EXPERTISE

OW150959 Tokyo KYODO in English 0516 GMT 15 Jun 82

[Text] Tokyo, 15 Jun (KYODO)--U.S. military experts have been seeking data on Nippon Electric Co's latest highly efficient ferrite radio wave absorber that could make aircraft and ships "invisible" to radar, informed sources said Tuesday.

The sources said this could lead to a request for samples in future.

Likewise, the Japanese Defense Agency is studying the new material, indicating the new absorber will be used for military purposes, the sources said.

The NEC version is said to be seven to 10 times better than conventional high frequency range products since it can absorb 99 percent of radio waves.

The new product can, by changing thickness, cover the 1-20 gigahertz frequency range now being used in radar and microwave communications.

NEC has developed the absorber to counter electro-magnetic wave interference in the private sector. It features a combination of transformer and absorber layers that collect radio waves.

The transformer layer consists of ferrite and epoxy resin while the absorber layer is made up from sheet metal and eposy resin.

The U.S. and some European countries already have developed radio wave absorbers, and in the U.S. has already begun aerial tests.

CSO: 4120/306

SCIENCE AND TECHNOLOGY

JAPAN TO REVIEW SPACE DEVELOPMENT PROGRAM

OW170104 Kokyo KYODO in English 0010 GMT 17 Jun 82

[Text] Tokyo, 17 Jun (KYODO)--The space activities commission has decided to conduct a review of the space development program outline decided by the government in 1978 because of changes in the situation in the past four years.

The commission, chaired by Ichiro Nakagawa, director general of the science and technology agency, decided Wednesday to make a restudy of the outline since demand for satellites for practical use has increased and since the situation concerning space development has undergone a change after the outline was drafted in 1978.

The present outline sets the guideline for Japan's space development to be carried out over a period extending around 15 years.

Based on the outline, the National Space Development Agency is now engaged in the development of an H-1 rocket capable of placing a satellite in the 500-kilogram class into stationary orbit.

But communication and other satellites for practical use have become larger in size and launching of such satellites will not be possible until the H-1 rocket is developed and completed.

Therefore, Japan may have to rely on space shuttles of the U.S. and rockets of the European Space Agency (ESA) to place such satellites into orbit.

In view of this, the Nippon Telegraph and Telephone Public Corporation, Japan's biggest user of satellites, has asked the government to develop a large rocket as early as possible.

The Liberal-Democratic Party's ad hoc committee on space development also drafted a proposal recently in which it called for advancing the schedule for development of the H-1 rocket and boosting the capacity of the rocket.

Under present plans, the government plans to complete development of the H-1 rocket so that it can be used from the latter half of the 1980s.

CSO: 4120/306

MITI INDUSTRIAL TECHNOLOGY POLICY OUTLINED

Tokyo KOGYO GIJUTSU in Japanese Vol 23, Mar 82 pp 16-34

[Text] A look at Japan's internal and external environment shows an accumulation of problems that are difficult to resolve such as the trade imbalance between the Western nations and Japan, the catching up of semiadvanced industrial nations, the restriction on energy resources, etc. In order for Japan to continue positively as an economic power while maintaining economic and social vitality under such conditions, a maximum utilization of brain resources, perhaps Japan's only resource, is of extreme importance. In other words, from here on Japan must take the path toward becoming a technology-based nation.

From such a standpoint, the Ministry of International Trade and Industry has decided to continue to exert greater energy to develop policies for the advancement of technological development.

MITI's basic technology policy is to create an environment wherein the private sector, which is the nucleus of our country's research and development, can manifest its maximum energy. However, MITI will carry out its own R&D in a field where smooth R&D cannot be expected from the private sector.

Furthermore, the goal of the industrial technology policy is not merely the R&D itself but to establish and enforce R&D as a close and inseparable part of the fulfillment of the policies on trade, industry, energy, etc.

MITI's budget for the industrial technology policy is shown in Tables 1-3 (MITI Industrial Technology Budget [Agency of Industrial Science and Technology]).

These tables show a total budget of 222 billion yen (government draft budget) for the industrial technology necessary for the advancement of industrial technology policy by MITI for FY-82. This is a slight increase over the FY-81 total of 221.8 billion yen.

From the standpoint of the main policy, the budget for the "policy for the advancement of energy technology" shows a decrease of 1.3 percent from the previous year to 106.9 billion yen, but a more determined advancement of development and introduction of oil substitute energy, energy conservation and other measures will be carried out.

In regard to the "policy for the advancement of creative intensive industrial technology and knowhow," 40.3 billion yen, or an increase of 6.2 percent over the previous year, is seen to promote substantial expansion of the "Next-Generation Industrial Base Technological Research and Development System" formed last year. In the "advancement of industrial cooperation," 24.8 billion yen, an increase of 66.3 percent, has been appropriated for the project for expanded liquefaction of lignite coal between Japan and Australia and others. Regarding the "preparation of the foundation for technological development," 139.2 billion yen, an increase of 8 percent, has been appropriated to expand the patent rights system, etc. A decrease of 0.4 percent to 8.8 billion yen is shown for the "measures for other social needs," but policies to meet the social needs are planned by starting a "vital area technological R&D system" and a "smaller enterprise oil substitute energy development project."

From the standpoint of steps to be taken, the budget for the government's own technological development (performed by affiliated testing and research institutes) among those sponsored by the government shows an increase of 0.4 percent from the previous year, to 45.6 billion yen, and those to be contracted out to 90 billion yen, an increase of 14.1 percent over the previous year. The budget for the advancement of technological development by the private sector was increased by 5.5 percent to 48.1 billion yen.

1. Advancement of Energy Technology

Energy is the most basic element in the maintenance and development of economic society and people's livelihood. In order for Japan to continue with the favorable economic growth and improved people's welfare, the most important policy is in the assurance of a stable supply of energy. As a part of the comprehensive energy policy, MITI has promoted a development of energy technology in a variety of fields. These include the Sunshine Project, aimed at technology for the development, production, usage and stable supply of oil, nuclear energy and coal, and the Moonlight Project, aimed at development of energy conservation technology.

These projects are outlined below.

1-(1) On Oil

Oil Development Technology

Japan's oil development enterprise is not only frail compared with the major Western firms with a history of over 100 years, but also lags behind in technology. Moreover, Japan's plant manufacturers as a whole are also behind in oil development technology due to the limited domestic market and the lack of technical information feedback from the oil development enterprises.

However, the acquisition of technological knowhow has become an important condition for gaining concessions for oil development. Recently, in particular, the development of oil technology has become urgent for meeting the demands of the oil-producing countries to improve their secondary or tertiary

oil recovery rate and to cope with the unfavorable natural conditions (polar region, deep-sea drilling, etc) of the targeted areas for oil. For this, the following measures have been adopted.

A. Development of Secondary-Tertiary Recovery Technology (52.8 billion yen)

In regard to the secondary-tertiary recovery technology of using chemicals and heat, a pilot plant will be used to carry out R&D at an oil site under the 5-year plan beginning in FY-82.

B. R&D on Oil Shale Technology (1.956 billion yen)

R&D on technologies covering oil shale mining, pulverizing and carbonization will be carried out by a pilot plant under the 5-year plan between FY-81 and FY-85.

C. R&D on Sea Bottom Oil Production System (4.091 billion yen)

D. Study of Development of Ocean Oil Production Platform (100 million yen)

E. Developmental Study of High-Performance Drilling Technology for Ocean Oil Development (53 million yen)

F. R&D on Technology for Exploration of Oil, Etc, by Satellite (1.386 billion yen)

Oil Refining Technology

Oil continues to occupy the top position as a primary source of energy for Japan, but the import of crude is becoming more critical because of the effect of the light crude preservation policy of the oil-producing countries. On the other hand, the domestic demand structure for petroleum products is turning toward lighter oil due to the increasing demand for intermediate fractional oils such as kerosene, and less demand for B and C grade oils. Since the petroleum products are derived through the process of refining crude oil, it is feared that the appropriate supply and demand balance of all petroleum products cannot be maintained if the present situation continues.

For this reason, various heavy oil measures are being worked out to obtain a stable supply of intermediate fractional oils. As a drastic measure, the promotion of development and introduction of heavy oil technologies beginning with heavy oil distillation technology has been worked into the budget since FY-79.

The promotion of the above technology development project is headed by the Heavy Oil Countermeasure Technology Research Group established in June 1979 by various enterprises involved in oil refineries, steel works and electrical power. The outline of this project is given below.

A. R&D of Heavy Oil Technology (3.986 billion yen)

(1) Development of heavy oil distillation technology for increase of intermediate fractional oil

R&D of a pilot plant of up to 100 B/D class (completion expected in FY-82)

(2) Development of technology for usage of inferior quality residual oil for steel making (completion expected in FY-83)

(3) Development of technology for burning of inferior quality residual oil (completion expected in FY-82)

B. Development for Application of Heavy Oil Technologies (1.223 billion yen)

The development of heavy oil distillation technology will be conducted at the 10,000 B/D class practical plant (start in FY-82), completion expected in FY-85).

C. Development of Technology for Effective Use of Heavy Oil Residual Products (2.999 billion yen)

This is for the development of city gas and hydrogen manufacturing technology using heavy oil residual products such as asphalt for raw material (completion expected in FY-85)

The results of a study made by the IEA during the latter half of the 1970's on long-range energy supply and demand point out that due to the limitation in oil production, a shortage of energy will begin during the latter half of the 1980's or in the 1990's if the development and usage of coal and nuclear power are delayed.

Therefore, budgetary actions have been taken since FY-80 for the development and introduction of a new fuel oil to replace the present intermediate fractional oils.

The new fuel oil project, targeted for completion in FY-86, is being promoted mainly by the New Fuel Oil Development Technology Research Group formed in May 1980 by various enterprises involved in oil refineries, fermentations, etc. Its outline is as follows (3.283 billion yen).

A. Development of Technology for Manufacture of Hydrocarbon Oil and Oxy-Fuel Oil From Synthetic Gas

B. Development of Technology for Improvement and Refinement of Sand Oil and Shale Oil

C. Technology for Usage of Biomass (Cellulose Decomposition-Fermentation, Fixed Yeast Fermentation)

In addition, budgetary actions have been taken since FY-79 to participate in the EDS oil liquefaction project (250 tons/day pilot plant) being promoted jointly by Japan, the United States, West Germany and Italy (756 million yen).

Oil Storage Technology

A. Survey of Underground Storage (313 million yen)

A test through use of a substantiation plant (25,000 kiloliters, located in Kikuma, Ehime Prefecture) which started in FY-81 will be continued to study the suitability of the water-tight underground storage system (rock bed) used in Northern Europe from the standpoint of safety and economy. During FY-82, a comprehensive evaluation up to the present operation, which is centered on oil, will be included.

B. Study of Solid Storage (1 of 11)

Solid crude oil of high pour point at normal temperature (from the southern region and China) accounts for 15 percent of Japan's oil imports. It is an important non-Middle East low-sulfur crude. Normally, this type is heated for storage. A test will be conducted on a system of liquefying only the amount needed at the time so that the oil can be stored in a solid form without normal heating.

1-(2) Nuclear Energy Technology

Japan has made progress in the development of nuclear power, a core of oil substitute energy, but it must strive toward improved operational rate and dependability while insuring complete safety. It is also necessary to promote the active acquisition of sites through obtaining people's understanding and cooperation, beginning with the local residents. Moreover, the establishment of Japan's own nuclear fuel recycling is indispensable for the smooth development and usage of nuclear energy.

Under such conditions, a greater push toward development of nuclear energy is required, and MITI is pushing the project by placing emphasis on the following points.

Safety Assurance and Improved Reliability of Nuclear Power Plants

A. Advancement of Substantiation Tests, Etc, for Improvement of Light Water Reactor (1.882 billion yen)

In order to obtain greater safety and reliability of nuclear reactor power generation, Japanese type light water reactors suited to local conditions are necessary. For this purpose, a third improvement and standardization study will be carried out, and through substantiation tests, practical use of the internal pump system and high-performance fuel technology will be promoted. In view of the practical use of plutonium in light water reactors, the designing of fuel assembly will be implemented.

6. Advancement of Reactor Disposal Measures (114 million yen)

In addition to substantiation tests on principal technologies from the standpoint of safety and reliability, studies of dismantling technique, [illegible] effect evaluation, etc, will be conducted in line with the [illegible] of existing reactors.

C [illegible]velopment of Nuclear Power Support System (1.600 billion yen

With a view to attaining greater reliability of nuclear power plants, a support system to alleviate the workload of operators in daily operation and [illegible]agement will be promoted.

d. Completion and Strengthening of Nuclear Plant Safety Measures (2.513 billion yen)

An improvement and testing of analyzer codes for safety checks and earthquake analyzer codes will be conducted. In addition, support will be given to the testing of an automatic inspection device in order to diminish the radiation exposure of those engaged in routine inspections.

E. Expansion of Reliability Testing of Nuclear Facilities

The reliability of nuclear power plants in withstanding earthquakes will be tested by a large high-performance vibration platform in order to remove the apprehensions of the local residents. Moreover, substantiation tests for the safety and reliability of vital parts affected by heat such as valves, fuel assembly and welded parts of pipes, etc, and electric instruments for pumps, etc, of nuclear power plants will be conducted under operating conditions of equal or greater load than the actual model.

Establishment of Japan's Own Nuclear Fuel Cycling

A. Stable Supply of Uranium Resources (569 million yen)

Diverse sources for the supply of uranium, which is totally dependent on foreign countries, will be sought and independent development will be promoted. A recovery system to obtain uranium from the ocean will be developed as Japan's own supply source.

B. Stable Supply of Uranium Enrichment Service (1.111 billion yen)

In order to obtain an independent nuclear fuel cycling and stable supply of uranium enrichment service, the industrialization of uranium enrichment will be pushed forward. For this purpose, the construction of a prototype enrichment plant along with the establishment of manufacturing technology for uranium enrichment centrifuges will be promoted. Additionally, studies of the technology and economy of uranium enrichment and a preparatory study of a site for a commercial-scale enrichment plant will be conducted.

Moreover, a developmental subsidy will be provided to establish a chemical method of enrichment as a supplement to the centrifuge method of enrichment.

C. Construction of Commercial Reprocessing Plant (2.622 billion yen)

The establishment of a reprocessing operation, a key to nuclear fuel cycling, has become a vital part of the development and usage of nuclear energy.

For this purpose, a commercial-scale reprocessing plant will be built with the target of operating in FY-90. The government will conduct substantiation tests of principal reprocessing equipment and machineries, process operation and adopt measures for sites. Funds necessary for such construction will be guaranteed.

D. Radioactive Waste Processing and Disposal (45 million yen)

The aggregate total of low-level radioactive waste is expected to multiply as the scale of nuclear power plants becomes larger. The high-level radioactive waste generated from the reprocessing of spent fuel remains highly radioactive for a long time; therefore, the early establishment of a reprocessing and disposal system is necessary. A feasibility study of a commercial reprocessing-disposal system will be conducted for the formulation of a national policy. For early central land disposal of the low-level radioactive waste stored at the nuclear power plants at present, a safety test of a low-level radioactive waste disposal facility will be performed to facilitate smooth acquisition of a disposal site.

Development and Usage of New Reactors

Studies centered on technology and economy will be conducted for the practical use of a fast breeder reactor (FBR), which has a very high utilization rate of enriched uranium.

A detailed feasibility study of the practical use of a smaller light water reactor which can meet the local conditions will be carried out.

I-(3) Development of Coal Technology

Coal Production Technology

--Subsidy for promotion of coal technology (276 million yen)

- Subsidy for promotion of technologies for coal production and usage (477 million yen (production))

In order to establish a stable production system for Japan's coal industry and a supply of domestic energy resources, the mechanization of steep-incline coal mining and the labor-saving automation of slight-incline coal mining, started in FY-81, will be continued. New R&D on automation of slight-incline and medium-thick coal mining and machineries for open-pit mining targeted mainly for overseas mine development will be started.

Coal Usage Technology (Short-Medium Range)

--Subsidy for promotion of technologies for production and usage (3.649 billion yen (for usage))

In order to expand the usage of coal, research is being carried out on items designated by the minister of MITI for coal usage which can be developed in the short-medium term with great developmental effect. Designated items include fluid bed burning, smoke treatment, COM, handling, fabricated coke, effective use of coal ash and processing of waste water. Each item is targeted to become practical around 1985. In 1982, an operational test of a fluid bed pilot plant (20 tons/hour), construction of a fabricated coke pilot plant (200 tons/day) and conversion of an industrial COM boiler will be carried out.

Coal Liquefaction and Gasification

A. As part of the Japan-U.S. scientific and technological cooperation, an industrial scale pilot plant (250 tons/day) will be built during FY 79-84 with an investment of about $400 million (Japanese side is liable for about 8.5 percent), and an operation research will be conducted. In FY-82, preparatory development of residual direct burning and development of residual partial oxidation will be enforced.

B. Subsidy for Development of Coal Gasification (2.450 billion yen)

As part of the Sunshine Project, technology for the manufacture of a clean low-caloric gas from coal for power generation and a complex cycle power generation system connected to the low-caloric gas system will be developed. In FY-82, an operational test of a gasification pilot plant of 40 tons/day capacity will be continued from last year and a design for a 1,000 tons/day capacity gas power test plant will be worked out.

C. Subsidy for Development of Coal Gasification (1.316 billion yen)

As part of the Sunshine Project, technology to manufacture high caloric gas from coal by adding heavy oil and oxygen-vapor or by hydrogen reaction will be established. In FY-82, a gasification test will be conducted using a small device and at a 7,000 cubic meters/day plant.

Testing of Coal Thermal Power Plant

A. Contract Funds for Testing Soot and Smoke Processing (210 million yen)

A total denitration plant will be established by a 250,000-kilowatt class coal thermal facility to determine whether the processing of soot and smoke from a coal burning plant can match that of an oil burning plant.

B. Contract Funds for Testing Dry-Type Desulfurization of Coal Thermal Plant (871 million yen)

A dry-type desulfurization facility will be established at a large local thermal plant to test the dry-type desulfurization of technology, which has the superior feature of not requiring a large amount of water or a drainage processor as compared to the wet type. An operational performance test will also be conducted.

C. Contract Funds for Testing COM Conversion at Oil Thermal Plant (1.683 billion yen)

In order to promote COM conversion at the existing oil thermal plants, a remodeling of boilers and installation of a pollution prevention device and a COM producer will be carried out at one of the existing thermal plants to study the burn characteristics and wear resistance of the boilers.

D. Contract Funds for Testing High-Performance Dust Collection at Coal Thermal Power Plants (524 million yen)

As a measure to cope with ashes and dust at coal thermal power plants, a technology using electric dust collectors is being used widely, but the development and testing of a high-performance dust-collecting technology will be carried out to establish a dust-collecting capability equal to the oil thermal plant by the coal thermal plant.

E. Subsidy for Development of High-Performance Coal Thermal Technology (240 million yen)

In order to obtain rapid improvement in the thermal efficiency of a plant through higher steam temperature and pressure in a coal thermal plant, a test on the body of rotation of the super-high-temperature steam turbine of a boiler tube will be conducted.

1-(4) Advancement of Sunshine Project

The Sunshine Project is a long-range and comprehensive technology development project, which by putting new technologies into practical use is aimed at the stable supply of energy essential to the normal progress of our society, economy and livelihood. Since the project started in FY-74, R&D centered on the government has been promoted with industrial and academic cooperation. At present, the main projects have progressed from the basic research stages to research stages accompanied by the development of plants (see Table 4).

The future of the international energy situation remains unclear, and thus expectations are growing for the practical use of new energy technologies. Therefore, there is a need to promote the development of a full-scale plant through positive application of the New Energy Development Organization established 3 years ago and also to tackle basic researches by consolidating the research brains of the concerned sectors. From the standpoint of

diversification of risks and effectiveness of R&D, positive international cooperation through multination IEA cooperation and bilateral cooperation such as between Japan and Australia are required.

On this basis, the project plans to promote positive R&D through acquisition of an industrial budget (see Table 5) of approximately 41.6 billion yen, which is necessary for the smooth implementation of various projects.

A breakdown of the energy projects will be given for the FY-82 research and development projects.

Solar Energy

A. Operational Research on Solar Heat Power Plant

In order to pursue the technological and economic feasibility of solar heat power generation, operational research on two types of 1,000-kilowatt class pilot plants (curved surface collector type and tower collector type) will be continued from the previous year.

B. Advancement of Technology for Practical Use of Solar Power System

Technological development to lower the cost of solar cells and the use of solar cells will be implemented to put the solar power system into practical use. During FY-82, testing and manufacture of low-cost silicone and solar cell panels and the construction of a solar power system and a collective light power system will be continued from last year. R&D on peripheral technology, a solar cell assessment system and a light and heat hybrid type solar power system will be continued.

Moreover, basic studies on R&D of an amorphous solar cell will be carried out to find ways to cut down the cost of future solar cells.

C. Development of Solar System for Industrial Use

In order to establish practical technology for an industrial solar system (solar heating, cooling and hot water system), a practical technology needed especially in the high-level heat control system will be developed. The manufacture of essential equipment and machineries and some construction will be continued during FY-82.

Geothermal Energy

A. Development of Probing and Mining Technologies

A survey using the Curie point method and the gravity method, data processing and analysis will be conducted in FY-82 to discover the geothermal source conditions and to promote a long-range and systematic development. At the same time, basic national geothermal maps will be prepared and an evaluation of prospective regions will be made. Geothermal probe technologies used up to now will be compiled to establish a probe technology suited for deep

geothermal resources, and during FY-82, a 200-meter boring probe and 1,500-meter structural drilling and probing will be carried out.

As part of the Sunshine Project, substantiation studies on the environmental safety of a large-scale geothermal plant, which have been underway since 1978 in "Toyogoe District /phonetic/," will be continued.

B. Development of Hot Water Power Generation System

During FY-82, a basic design of a 10,000-kilowatt binary power plant and a hot water reduction test will be continued in order to find effective usage for a large amount of hot water gushing out with terrestrial steam. In addition, construction of a total flow power plant will be initiated.

C. Development of Deep Hot Water Supply System

Test drilling, extraction and reduction testing will be conducted in FY-82 to decide on the technology for local heating involving a hot water supply using the nonvolcanic geothermal energy which exists widely in the sedimentary plains.

Coal Energy

In order to utilize coal, which is found abundantly with less regional maldistribution than oil, development of liquefaction and gasification technologies will be promoted to convert coal into fluid fuel and to eliminate environmental pollutants in the process.

A. Development of Coal Liquefaction

During FY-82, operational research on an 0.1-2.4 tons/day capacity plant will be carried out for the development of bituminous coal liquefaction technology. As for lignite coal liquefaction, construction of a 50 tons/day capacity plant will be continued in Victoria Province, Australia.

Moreover, essential studies on the development of equipment for a large-scale plant essential for early realization of coal liquefaction will be implemented.

B. Development of Coal Gasification

An operational test of a 7,000 cubic meters/day high-caloric gas pilot plant and basic research on plasma gasification technology, etc, will be carried out in FY-82. As part of the Sunshine Project, operation of a 40 tons/day capacity low-caloric gasification pilot plant will be conducted.

Hydrogen Energy

In order to establish a technology to manufacture hydrogen cheaply from water, a high-temperature-pressure water electrolysis pilot plant with a capacity

for manufacturing hydrogen at 20 Nm^3/hour will be conducted. Furthermore, basic research on other hydrogen-producing methods, transportation and storage of hydrogen and combustion technology will be carried out.

General Research

In FY-82, a 100-kW capacity wind power system will be completed, and a basic research and survey of technologies capable of contributing to future energy supply, such as the sea-thermal power generation system, will be conducted.

Moreover, support research such as information studies will be conducted for effective promotion of the Sunshine Project.

International Cooperation

For the purpose of efficiency and diversification of risks in R&D, the following international cooperation will be promoted aggressively during FY-82.

A. IEA Cooperation

Japan will continue to participate along with the United States and West Germany in the high-temperature rock power generation system project at Fenton Hill in the United States, and will strive toward effective use of geothermal energy from high-temperature rocks not accompanied by hot water. In addition, participation in projects such as a solar heating, cooling and hot water supply system, a coal technology information project, a wind energy project, an energy research and development system analysis project, etc, will be continued.

B. Bilateral Cooperation

Japan-Australia cooperation centered on solar energy and coal liquefaction will be promoted. Coal liquefaction technology cooperation will be carried out between Japan and China. Cooperation with France will be centered on the exchange of information on solar energy, etc. In addition, cooperation with Germany will be centered on coal energy and with the United States on solar and coal energy.

1-(5) Advancement of Moonlight Project

The role played by R&D in the promotion of energy conservation is very important. For this reason, the Agency of Industrial Science and Technology started the Moonlight Project in 1978 for the development of energy conservation technology.

As part of the large-scale energy conservation technologies for FY-82, new R&D on a multi-use Sterling engine will be initiated, followed by acceleration and expansion of R&D centered on large-scale energy conservation technologies such as a high-efficiency gas turbine, a new battery, a power storage system, etc. For these purposes, a general account budget (government draft) of 3.025 billion yen and a special account budget (government

draft) of 6.466 billion yen, for a total of 9.49 billion yen, have been appropriated (see Table 6).

Large-Scale Energy Conservation Technologies

A. Magneto Hydrodynamic (MHD) Power Generation

The goal is to obtain a composite system of over 50 percent heat efficiency through the development of an MHD system which will produce electricity by passing high temperature combustion gas through a powerful magnetic field and then combining this system with a steam power plant which will utilize the exhaust gas from the MHD system.

During FY-82, the experimental equipment (Mark VII) completed in 1980 will be used to determine the durability and power generation characteristics of power generation channels by continuing the 200-hour operational study (output of 100 kW) from last year. In addition, essential studies and overseas R&D trend studies on coal combustion will be carried out.

B. High Efficient Gas Turbine

Electricity accounts for approximately 30 percent of Japan's energy needs, but the conversion rate of primary energy sources (oil, coal) to electricity--that is, the heat efficiency of about 40 percent even in a modern thermal power plant--is very low. Therefore, an attempt is being made to develop a composite power generation system (about 55 percent) using both a gas turbine and a steam turbine.

A 7-year plan has been underway since FY-78. Included is construction of a 10,000-kW class pilot plant (combined heat efficiency of over 50 percent) which started in 1981. Preparations will be made to carry out substantiation operation scheduled for FY-83. Essential technology and materials for the prototype plant (combined heat efficiency of 55 percent), which is the ultimate objective, will be developed.

C. New Battery Power Storage System

A high-efficiency, large capacity battery will be developed for "load smoothing" and conservation of energy in the entire power system. The plan is to use the electricity storage system to conserve electricity during off-peak hours and release it during peak hours.

Research for this system began under an 11-year plan in 1980. During FY-82, a facility for this system will be designed, and essential research will be carried out on 1 kW batteries of sodium-sulfur, lead-harogen and Redox flow types. In addition, a total system analysis of load pattern, etc, will be made.

D. Fuel Cell Power Technology

In view of the increasing demand for electricity, improved efficiency is essential in large power plants and transmission systems, but along with this, development of a smaller, decentralized power system to replace obsolete thermal power plants is also important.

For this purpose, efforts will be made to develop a low-polluting fuel cell, which can utilize natural gas as fuel, with a power efficiency of 40 percent (combined efficiency of 80 percent if waste gas is used). The research for this started in 1981 under a 6-year plan by concentrating R&D on the phosphoric acid type fuel cell, which is the closest to being developed for practical use.

R&D on essential technologies for the phosphoric acid fuel cell as well as for an alkali type, a fused carbonate type and a solid electrolyte type will be conducted during FY-82.

E. Multipurpose Sterling Engine (new item)

Development of a so-called heat engine, which utilizes heat energy converted from oil, etc, in terms of energy consumption, ranks very high. The improvement of conversion efficiency (heat efficiency) has become a major issue in various countries.

Thus, this Moonlight Project includes R&D on a high heat-efficient and low-polluting multipurpose Sterling engine which can utilize fuels other than oil to create power for cooling and heating of homes, businesses and small shops.

The project will be started in FY-82 under a 6-year plan to study the design, manufacture and operation of a Sterling engine in order to come up with a practical technology.

As a starter, in FY-82 R&D on essential technologies (sealing device, etc) for the engine will be conducted.

Guiding and Basic Energy Conservation Technologies

Various laboratories under the Agency of Industrial Science and Technology are conducting R&D on technologies which will become the "seeds" for future energy conservation, applicable in new fields and those not readily manageable by private firms.

In FY-82, R&D on superconductive transmission will be continued and R&D on Kalium turbine and high efficiency EHD heat exchange technologies will be initiated.

International Cooperation in Energy Conservation

In order to promote R&D on energy conservation effectively, trends in related technologies and R&D situations both in Japan and abroad must be grasped

regularly and accurately. Simultaneously, research through the cooperation of high energy consuming advanced nations is essential. Since April 1978, Japan has participated in the agreement with the IEA (International Energy Agency) to carry out the energy cascading project and the improved heat pump system.

Comprehensive and Effective Method of Gaining Technologies (new item)

Needless to say, the technological development of equipment, plant, etc, is important for effective energy conservation. Along with this, items for energy conservation technologies must be selected from the medium- and long-range views.

For this, studies to find a comprehensive and effective method of grasping new energy conservation technologies will be started in FY-82. Technology related charts will be used to select new items for development, and the effects of energy usage at various stages on resources, conversion, transmission, etc, will be studied through the use of a total energy flow model.

Preparations for the total energy flow model and charts on technologies related to energy conservation will be started in FY-82.

Assistance in Energy Conservation Technologies

In regard to R&D on energy conservation technologies by private enterprise, the government will provide subsidies so that the private sector can carry out its own R&D on essential technologies.

During FY-82, subsidies for competitive development of an energy conserving refrigerator, energy conserving technology for the production process, etc, in the home appliance field will be continued. In addition, an expansion of the subsidy system is being planned to provide assistance regarding the common and basic industrial needs for energy conservation.

Standardization of Energy Conservation

Energy conservation information approved by the Japan Industrial Standards (JIS) or by the JIS marking ( ) is useful in the selection and use of products by consumers to contribute toward conservation of energy. "Studies on the standardization of energy-conserving materials and equipment" and others will be continued, and a new "research and study on the standardization of energy-conserving home appliances" will be started in [illegible]

I-(6) Other Energy Related Measures

New Measures

In order to subsidize the joint development by multiple enterprises of multi-use, revolutionary oil substitute technologies in large energy-consuming industries, new special funds of 1.231 billion yen for the development of a common and basic oil replacement energy will be provided in FY-82.

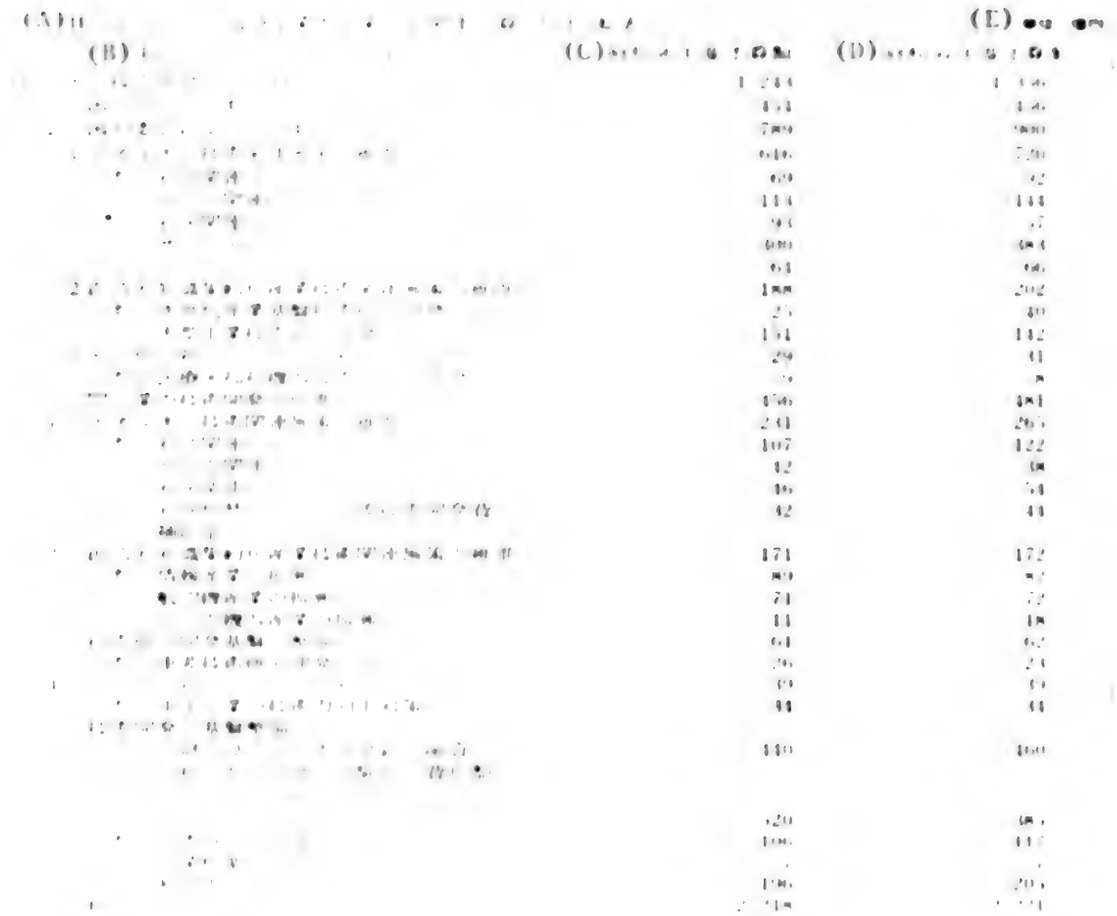
Continuing Measures

Measures aimed at reducing oil use will be enforced. Measures to be continued from last year, including subsidies (special for coal: 2.901 billion yen; 2.901 billion yen in 1980) for the development of oil substitute energy technology for practical use and subsidies (special for electricity: 301 million yen; 301 million yen in 1980) for the development of new electrical power technologies for practical use, will be provided to assist the private sector in its oil replacement efforts. In addition, contract fees will be appropriated (special for electricity: 50 million yen; 42 million yen in 1980) for the development and study of a system to remove sand at the dam sites of power plants for the fuel cell demonstration project (special for electricity: 20 million yen; 20 million yen in 1980), testing of sea water pumping technology (special for electricity: 106 million yen; 90 million yen in 1980), study of environmental safety of geothermal power plants (special for electricity: 56 million yen; 55 million yen in 1980), and for the study of effective use of hot water at geothermal power plants (special for electricity: 1.638 billion yen; 1.663 billion yen in 1980). (Resources and Energy Office of the Agency of Industrial Science and Technology)

Key:

A. Table 1. MITI FY-82 Budget for Industrial Technology (by policies)
B. Item
C. Budget for FY-81
D. Budget draft for FY-82
E. In 100,000,000 yen
F. (Note) Totals do not match due to overlapping, etc

1. Energy technology related measures
   Including: Oil related
   Nuclear energy related
   Coal related
   Sunshine Project
   Moonlight Project
2. Creative intensive industrial technology and knowhow
   Including: R&D of next-generation industrial base technology
   R&D of large industrial technology
   Advancement of information industry
   Advancement of aircraft industry
   Advancement of space industry
   Advancement of nuclear energy equipment industry
3. International cooperation
4. Preparation of basis for technical R&D
   Including: Expenses for Agency of Industrial Science and Technology
   Strengthening of patent rights and industrial rights systems
5. For other social needs
   Including: Improvement of technology for smaller enterprises
   Medical and welfare equipment
   Environmental safety, protection and disaster prevention
   Regional advancement measures



Key:

A. Table 2. MITI FY-82 Budget for Industrial Technology (by means)
B. Item
C. Budget for FY-81
D. Budget draft for FY-82
E. In 100,000,000 yen
1. Technical development by the government
   (1) By government
   (2) By contracting out
      ① Energy technologies
         Including: Oil
                    Nuclear energy
                    Coal
                    Sunshine Project
                    Moonlight Project
      ② Creative intensive industrial technology and knowhow
         Including: R&D of next-generation industrial base technology
                    R&D of large industrial technology
      ③ For other social needs
         Including: R&D of medical and welfare equipment technology

[Key continued on following page]

2. Technological development by private sector
   (1) Energy technology
       Including: Oil related
                  Nuclear energy related
                  Coal related
                  Development of oil substitute energy
                  Subsidies
   (2) Creative intensive industrial technology and knowhow
       Including: Information industry
                  Aircraft industry
                  Nuclear energy equipment industry
   (3) Preparation of basis for technical R&D
       Including: Subsidies for important technical R&D
   (4) For other social needs
       Including: Improvement of technology for smaller enterprises
   (5) Basic preparations for technological development
                  Investment: Japan Development Bank
                  Taxation: Added testing research expenses deductible

3. Others
   Including: For technical cooperation
              For industrial standardization
              For patent rights, etc

   Totals

(A)

(B)	(C)			(D)			(H)
	(E)	(F)	(G)	(E)	(F)	(G)	
	9 611	97 294	106 937	10 444	97 846	108 290	
	9 311	89 628	98 939	10 178	92 284	102 462	
	104	21 405	21 509	118	17 614	17 732	
	0	16 110	16 110	0	13 201	13 201	
	0	15	15	0	51	51	
	0	1 956	1 956	0	1 246	1 246	
	0	100	100	0	23	23	
	0	53	53	0	64	64	
	0	701	701	0	273	273	
	0	528	528	0	147	147	
	118	3 886	4 004	118	3 396	3 514	
	0	3 996	3 996	0	5 704	5 704	
	0	1 271	1 271	0	0	0	
	0	899	899	0	1 185	1 185	
	0	1 261	1 261	0	3 466	3 466	
	0	616	616	0	616	616	
	0	313	313	0	202	202	
	0	151	151	0	170	170	
	0	696	696	0	130	130	
	0	1 306	1 306	0	1 016	1 016	
	0	15	15	0	0	0	
	288	15 341	15 629	288	15 547	15 835	
	288	14 443	14 731	288	14 443	14 731	
	0	4 064	4 064	237	4 081	4 318	
	0	4 064	4 064	237	2 977	3 214	
	0	0	0	201	0	201	
	0	708	708	0	708	708	
	0	538	538	0	538	538	
	0	0	0	86	0	86	
	0	69	69	0	40	40	
	0	1 361	1 361	0	1 331	1 331	
	0	620	620	0	490	490	
	0	1 106	1 106	0	1 106	1 106	

[Key on following page]

Key:

A. Table 3. MITI FY-82 Budget for Industrial Technology (by policies)
B. Item
C. FY-82 budget (in million yen)
D. FY-81 budget (in million yen)
E. General budget
F. Special budget
G. Total
H. Remarks

1. Advancement of measures related to energy technology
   (1) Oil
      ① Subsidy to study improvement in oil development technology
      ② Subsidy for research and study of oil shale development
      ③ Subsidy for development of ocean oil-production platform
      ④ Subsidy for development of high-performance ocean oil development
      ⑤ Grant for promoting oil development technology
         (i) R&D of secondary and tertiary recovery technology
      ⑥ Sea bottom oil production system
      ⑦ Subsidy for R&D of heavy oil countermeasure technology
      ⑧ Subsidy for practical use of heavy oil countermeasure technology
      ⑨ Subsidy for development of technology for effective use of heavy oil residues
      ⑩ Subsidy for R&D for new fuel oil technology
      ⑪ Contracting out for study of R&D on new fuel
      ⑫ Included in subsidy for study of rational oil distribution
         (i) Oil storage technology
         (ii) Development of long-distance ocean bottom pipeline technology
      ⑬ Subsidy for testing methanol conversion in oil thermal plants
      ⑭ Development of remote prospecting for oil resources
      ⑮ Development of safety technology for liquefied oil gas work
   (2) Nuclear energy
      ① Improvement in reliability of safety in nuclear power plants
         (i) Study of improved standardization of nuclear power facilities
         (ii) Subsidy for testing and improvement of light water reactor
         (iii) Subsidy for testing of automatic inspection of practical nuclear power reactors
         (iv) Study of disposal of discarded reactors
         (v) Subsidy for testing of nuclear reactors and discarded reactors used for power generation
         (vi) Subsidy for improvement of safety analysis codes for nuclear reactors
         (vii) Subsidy for testing and improvement of anti-earthquake safety analysis codes
         (viii) Subsidy for development of nuclear power generation support system

[Table 3 continued on following page]

事項	昭和57年度予算（百万円）			昭和56年度予算（百万円）			備考
	一般会計	特別会計	合計	一般会計	特別会計	合計	
② 自主的核燃料サイクルの確立	(0) 0	(4,887) 4,737	(4,887) 4,737	(0) 0	(3,596) 3,596	(3,596) 3,596	
(i) 海水ウラン回収システム技術確証調査費補助	0	569	569	0	373	373	
(ii) 化学法ウラン濃縮技術確立費補助	0	961	961	0	633	633	
(iii) 第二再処理工場技術確証調査など	0	2,622	2,622	0	2,191	2,191	
(iv) 海外再処理返還固化体受入システム開発調査など	0	493	493	0	399	399	
(v) ウラン濃縮遠心分離機製造技術確立費補助	(0)	(150)	(150)	(0)	(0)	(0)	2(3)ｲ(ii)に計上
(vi) ウラン濃縮事業化調査など	0	92	92	0	0	0	
3 新型炉の開発利用推進	0	27	27	19	27	46	
(i) 発電用新型炉の実用化調査	0	0	0	19	0	19	
(ii) 発電用新型炉利用システム開発調査	0	27	27	0	27	27	
4 新エネルギーの利用推進							
(i) 中小型新エネ開発調査など	0	75	75	0	63	63	
5 利用合理化エネ技術開発費補助等調査	27	0	27	33	0	33	
6 原子力発電施設等防災対策など	0	7,332	7,332	0	6,038	6,038	
7 原子力発電施設等における新型炉実証試験補助	0	0	0	0	1,712	1,712	
8 石炭関連	0 0	11,136 8,686	11,136 8,686	(0) 0	(28,928) 26,536	28,928 26,536	
1 石炭技術振興費補助	0	276	276	0	401	401	
2 石炭等大型発電実証試験など	0	0	0	0	6,953	6,953	
(i) 石炭火力発電用大型流動層技術実証試験など	0	210	210	0	2,800	2,800	
(ii) 石炭火力発電用新大型流動技術実証試験など	0	871	871	0	757	757	
(iii) 石油火力発電用COM転換実証試験など	0	1,683	1,683	0	3,331	3,331	
(iv) 石炭火力発電用高性能集じん技術実証試験など	0	524	524	0	65	65	
3 高性能石炭火力技術開発補助	0	240	240	0	0	0	
4 石炭生産利用技術振興費補助	0	4,126	4,126	0	3,456	3,456	
5 石炭液化システム生技術開発など	(0)	2,450	(2,450)	(0)	(2,392)	2,392	1(4)ｲ(ii)の内数
6 EDS石炭液化	0	756	756	0	716	716	
7 SRC－II石炭液化	0	0	0	0	15,010	15,010	
9 エネルギー技術の総合							
1 新エネルギー研究開発	6,222	35,414	41,636	6,932	26,727	33,659	
(i) 太陽エネルギー	2,120	6,591	8,711	2,322	5,640	7,962	
(ii) 地熱エネルギー	1,501	7,991	9,492	1,762	7,461	9,223	
(iii) 石炭エネルギー	748	19,889	20,637	880	12,634	13,514	
(iv) 水素エネルギー	391	529	923	444	504	948	
(v) 総合研究	658	409	1,067	749	484	1,233	
(vi) その他	800	5	805	774	5	780	

[Key on following page]

Key:

② Establishment of independent nuclear fuel cycling
- (i) Subsidy for testing technology for ocean uranium recovery system
- (ii) Subsidy for uranium enrichment by chemical method
- (iii) Subsidy for study of technology for second reprocessing plant
- (iv) Subsidy for developmental study of system for accepting reprocessed and restored fuels from abroad
- (v) Subsidy for establishment of technology for centrifuge for uranium enrichment
- (vi) Subsidy for industrialization of uranium enrichment

③ Development and usage of new reactors
- (i) Study of practical use of new ractor for power generation
- (ii) Developmental study on new power reactor

④ For new usage of nuclear energy
- (i) Subsidy for temporary storage of spent nuclear fuel

⑤ Study of intermediate storage of spent nuclear fuel

⑥ Subsidy for testing reliability of nuclear power plant

⑦ Subsidy for testing reliability of nuclear power facilities to withstand earthquake

(3) Coal

① Subsidy to promote coal technology

② Subsidy for testing thermal power plant such as coal-fired
Including:
- (i) Subsidy for testing soot and smoke processing technology for coal thermal power plant
- (ii) Subsidy for testing dry type desulfurizing technology for coal thermal power plant
- (iii) Subsidy for testing COM conversion of coal thermal power plant
- (iv) Subsidy for testing high-performance dust-collecting technology for coal thermal power plant

③ Subsidy for development of high-performance coal thermal power plant

④ Subsidy for promotion of coal production and usage technology

⑤ Contract for low caloric gasification technology

⑥ EDS coal liquefaction

⑦ SRC-II coal liquefaction

(4) Promotion of Sunshine Project

① R&D of new energy
- (i) Solar energy
- (ii) Geothermal energy
- (iii) Coal energy
- (iv) Hydrogen energy
- (v) Comprehensive research
- (vi) Others

[Table 3 continued on following page]

項目	昭和57年度予算（百万円）			昭和56年度予算（百万円）			備考
	一般会計	特別会計	合計	一般会計	特別会計	合計	
1 エネルギー技術の研究開発							
(1) エネルギー技術の研究開発	3,025	6,466	9,490	2,956	6,207	9,163	
① 電磁流体 MHD 発電	592	0	592	624	0	624	
② 高効率ガスタービン	896	5,139	6,035	970	4,949	5,920	
③ 新型電気事業用蓄電システム	249	609	858	242	404	646	
④ 燃料電池発電技術	251	367	618	158	80	239	
⑤ 超電導マグネット応用エネルギー機器	30	245	275	0	0	0	
⑥ 先導的基盤的エネルギー技術	198	0	198	208	0	208	
⑦ エネルギー技術調査等	5	0	5	16	0	16	
⑧ エネルギー技術に関する国際協力等	11	0	11	0	0	0	
⑨ エネルギー技術開発の総合	669	0	669	467	0	467	
⑩ エネルギー標準	49	0	49	56	0	56	
⑪ その他	74	106	180	214	773	987	
(2)	228	(11,333)	11,561	(150)	(7,974)	(8,124)	
	2	6,319	6,321	2	5,170	5,172	
(3)	(0)	(4,910)	(4,910)	(0)	(4,450)	(4,450)	
	0	1,850	1,850	0	1,850	1,850	
	0	50	50	0	42	42	
	0	106	106	0	90	90	
	(0)	(3,060)	(3,060)	0	(2,600)	(2,600)	1 (4) ① (a) の内数
	0	56	56	0	55	55	
	0	1,638	1,638	0	1,663	1,663	
2	0	(5,053)	(5,053)	(0)	(3,247)	(3,247)	
	0	4,433	4,433	0	3,202	3,202	
	0	1,231	1,231	0	0	0	
	0	2,901	2,901	0	2,901	2,901	
	0	301	301	0	301	301	
	0	(584)	(584)	(0)	(0)	(0)	5 (1) 8 (2) ア)
	0	36	(36)	(0)	(45)	(45)	5 (4) 3 (1) (2) ア)
	0	20	20	0	20	20	
	228	1,350	(1,578)	(150)	(1,159)	(1,309)	
	2	16	18	2	98	100	
	2	0	2	2	0	2	
	226	0	(226)	(148)	(0)	(148)	3 (1) ⑨ ア) の内数
	0	790	790	(0)	(515)	(515)	1 (1) 30の内数
	0	326	(326)	(0)	(338)	(388)	(a) 1
	0	218	(218)	(0)	(158)	(158)	1 (1) 31の内数
	0	16	16	0	98	98	

[Key on following page]

Key:

(5) Promotion of Moonlight Project
- ① R&D of energy conservation technology
  - (i) MHD power generation
  - (ii) High efficient gas turbine
  - (iii) New battery power storage system
  - (iv) Fuel cell power generation technology
  - (v) Multi-use Sterling engine
  - (vi) Guiding basic energy conservation technology
  - (vii) International cooperation on energy conservation
  - (viii) Method of comprehensive and effective grasping of energy conservation technology
  - (ix) Assistance in development of energy conservation technology
  - (x) Standardization of energy conservation
  - (xi) Others

(6) Others
- ① Less reliance of oil in power generation
  - (i) Contract out for development of sand-removing system at power generation dams
  - (ii) Contract out for testing sea water pumping system
  - (iii) Contract out for testing for environmental safety of large-scale deep geothermal plant
  - (iv) Contract out for technological research on environmental safety of geothermal power plant
  - (v) Contract out for study of effective use of hot water at geothermal power plant
- ② Development of oil substitute energy technology
  - (i) Subsidy for development of common and basic oil substitute energy technology
  - (ii) Subsidy for putting oil substitute technology into practical use
  - (iii) Subsidy for putting new power generation technology into practical use
  - (iv) Development of oil substitute energy for smaller firms
  - (v) Subsidy to study developmental plan for community energy system using substitute energy
- ③ Promotion of energy conservation
  - (i) Contract out for fuel cell demonstration
- ④ Biomass
  - (i) Use of biomass
  - (ii) Subsidy for R&D cooperative work, including manufacture of vegetable alcohol
  - (iii) Subsidy for development of new fuel oil
    - (a) Development of cellulose decomposition-fermentation technology
    - (b) Development of technology for producing alcohol by fixed yeast
  - (iv) Contract out for developmental study of new fuel technology, including feasibility study on usage of large amount of biomass resources
  - (v) R&D of technology for manufacture of fuel use alcohol

[Table 3 continued on following page]

	33,235	7,046	40,281	(32,426)	(5,517)	37,943
	33,180	7,046	40,226	32,373	5,517	37,890
	4,786	0	4,786	2,714	0	2,714
	2,596	0	2,596	1,356	0	1,356
	1,043	0	1,043	675	0	675
	1,128	0	1,128	673	0	673
	12,270	3,990	16,260	13,441	3,396	16,837
	30	0	30	0	0	0
	733	0	733	1,501	0	1,501
	3,533	0	3,533	2,745	0	2,745
	3,238	0	3,238	2,419	0	2,419
	2,527	0	2,527	902	0	902
	882	0	882	50	0	50
	813	0	813	30	0	30
	101	3,990	4,094	118	3,396	3,515
	16,180	3,056	19,236	(16,271)	(2,120)	(18,392)
	16,125	3,056	19,181	16,218	2,120	18,338
	8,863	0	8,863	9,100	0	9,100
	5,621	0	5,621	6,205	0	6,205
	426	0	426	15	0	15
	196	0	196	222	0	222
	2,620	0	2,620	2,658	0	2,658
	7,210	0	7,210	7,118	0	7,118
	398	0	398	2,043	0	2,043
	1,490	0	1,490	353	0	353
	5,322	0	5,322	4,722	0	4,722
	80	1,306	1,386	(53)	1,016	1,070
	26	1,306	1,332	0	1,016	1,016
	26	0	26	0	0	0
	0	1,306	1,306	0	1,016	1,016
	(55)	(0)	(55)	(53)	(0)	(53)
	0	1,750	1,750	0	1,104	1,104
	0	1,600	1,600	0	1,104	1,104
	0	150	150	0	0	0
	27	0	27	0	0	0

[Key on following page]

Key:

2. Advancement of measures for development of creative intensive industrial technology and knowhow
   (1) Next-generation industrial base technology
      ① New materials
      ② Biotechnology
      ③ New functional elements
   (2) Large project system
      ① New projects
         (i) Automatic cut & sew system
      ② Continuing projects
         (i) Resource reuse technology
         (ii) Complex production system using super performance laser
         (iii) Optical instrument control system
         (iv) Manufacture of basic chemical products using carbon monoxide, etc, as raw material
         (v) Manganese ore mining system
         (vi) High-speed calculating system for S&T
         (vii) Ocean bottom oil production system
   (3) Promotion of advanced technology industry
      ① Information industry
         (i) Subsidy for development of basic technology for next-generation computer
         (ii) R&D of fifth generation computer
         (iii) Development of health care network
         (iv) Subsidy for information process project
      ② Aircraft industry
         (i) Development of commercial transport plane (YX)
         (ii) Development of commercial transport plane (YXX)
         (iii) Development of jet engine (XJB) for commercial aircraft
      ③ Space industry
         (i) R&D of technology for remote resource probing
         (ii) R&D of technology for oil detection
         (iii) R&D of probe using resource satellite
      ④ Nuclear energy equipment industry
         (i) Subsidy for development of nuclear power plant support system
         (ii) Subsidy for determining technology for manufacture of uranium enrichment centrifuges
      ⑤ Study trend in high-level technology intensive industry

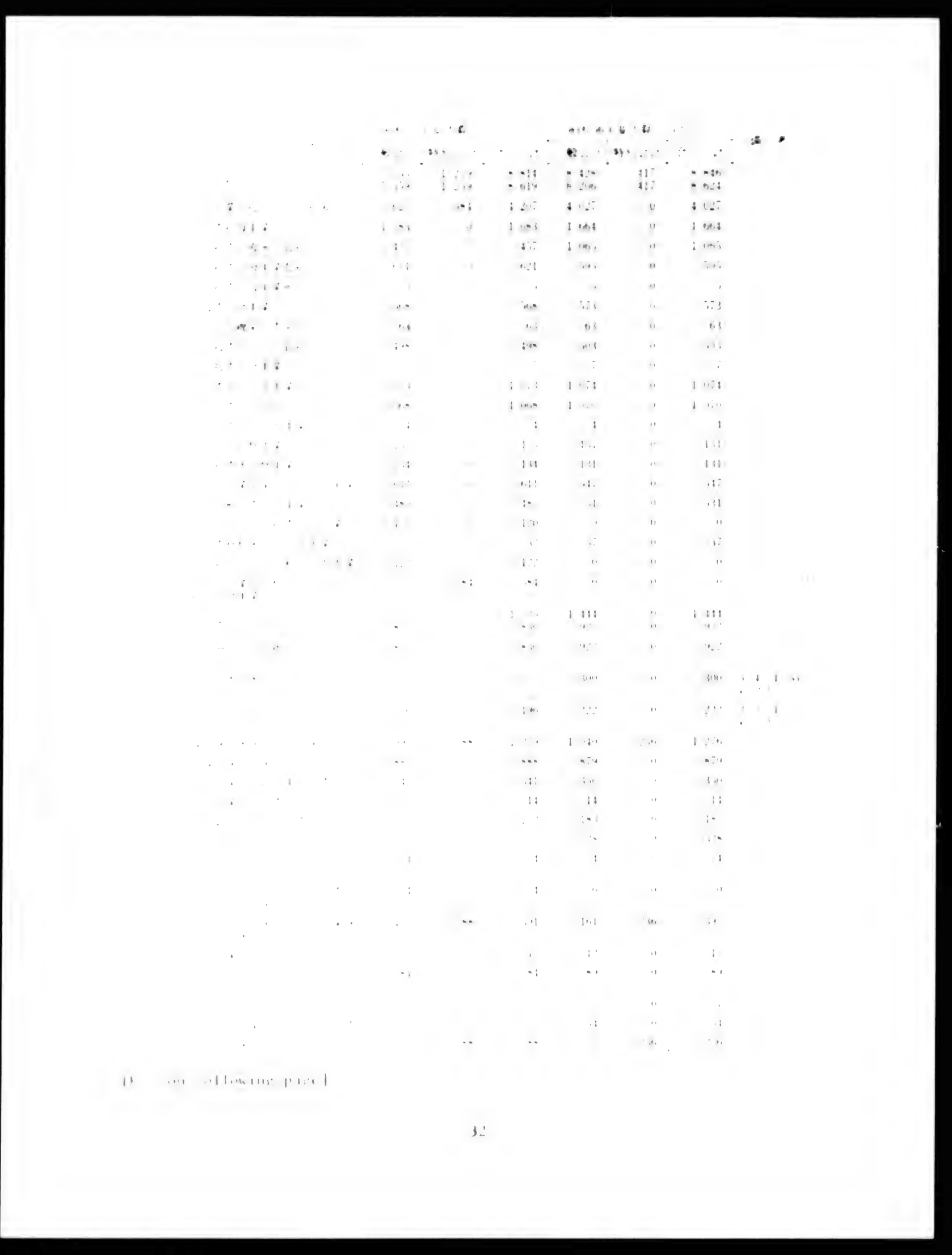
[Table 3 continued on following page]

[illegible]	[illegible]	[illegible]	[illegible]	11,677	[illegible]	[illegible]	
[illegible]	[illegible]	736	[illegible]	[illegible]	336	[illegible]	
[illegible]	[illegible]	736	11,706	10,286	336	10,622	
[illegible]	3,761	0	3,761	3,420	0	3,420	
[illegible]	61	0	61	58	0	58	
[illegible]	283	0	283	270	0	270	
[illegible]	[illegible]	0	[illegible]	2,987	0	2,987	
[illegible]	[illegible]	0	[illegible]	773	0	773	
[illegible]	[illegible]	0	[illegible]	73	0	73	
[illegible]	50	0	50	44	0	44	
[illegible]	[illegible]	0	[illegible]	[illegible]	0	[illegible]	
[illegible]	[illegible]	0	[illegible]	148	0	148	
[illegible]	2,191	0	2,191	1,963	0	1,963	
[illegible]	174	0	174	171	0	171	
[illegible]	218	0	218	163	0	163	
[illegible]	0	736	736	0	336	336	
[illegible]	[illegible]	[illegible]	13,230	931	[illegible]	[illegible]	
[illegible]	47	0	47	66	0	66	
[illegible]	41	0	41	39	0	39	
[illegible]	174	0	174	171	0	171	[illegible]
[illegible]	674	0	674	668	0	668	[illegible]
[illegible]	0	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	0	[illegible]	16	0	16	[illegible]
[illegible]	[illegible]	0	[illegible]	27	0	27	
[illegible]	22	0	22	20	0	20	[illegible]
[illegible]	8	0	8	0	0	0	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	80,411	[illegible]	[illegible]	
[illegible]	[illegible]	0	62,601	62,166	0	62,166	
[illegible]	[illegible]	[illegible]	[illegible]	60,722	[illegible]	100,255	
[illegible]	[illegible]	0	[illegible]	41,767	0	41,767	
[illegible]	[illegible]	0	[illegible]	2,718	0	2,718	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	6,932	26,727	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	9,400	2,956	6,207	9,163	[illegible]
[illegible]	0	3,202	3,202	0	3,202	3,202	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	13,131	[illegible]	[illegible]	[illegible]
[illegible]	2,295	0	2,295	2,610	0	2,610	
[illegible]	144	0	144	[illegible]	0	[illegible]	[illegible]
[illegible]	700	0	700	710	0	710	[illegible]
[illegible]	[illegible]	0	[illegible]	4,611	0	4,611	
[illegible]	[illegible]	0	[illegible]	[illegible]	0	[illegible]	
[illegible]	[illegible]	0	[illegible]	[illegible]	0	[illegible]	
[illegible]	13	0	13	13	0	13	
[illegible]	300	0	300	337	0	337	
[illegible]	[illegible]	0	[illegible]	[illegible]	0	[illegible]	
[illegible]	700	0	700	710	0	710	
[illegible]	123	0	123	128	0	128	

[... on following page]

3. Promotion of international cooperation
   (1) Technical cooperation
      ① Contract out to study overseas development plans
      ② Contract out to study general development plans
      ③ Contracts for international organs cooperative projects
         Including project for improvement of productivity in Asia
      ④ Subsidy for accepting and training of foreign technicians
      ⑤ Subsidy for dispatching of civilian specialists
      ⑥ Subsidy for technological cooperation with overseas smaller firms
      ⑦ Subsidy for overseas cooperation work
      ⑧ Subsidy for overseas consulting work
      ⑨ Subsidy for R&D cooperation work
      ⑩ Contract out for basic study on resource development cooperation
      ⑪ International industrial technology research work
      ⑫ Funds for UN Industrial Development Agency, etc
      ⑬ Subsidy for testing of desalinization technology using solar energy
   (2) Research cooperation
      ① International exchange of technology
      ② International industrial technology research work
      ③ For Sunshine Project
      ④ Japan-Australia cooperation for lignite coal liquefaction (part of Sunshine Project)
      ⑤ For Moonlight Project
      ⑥ Japan-U.S. technical cooperation
      ⑦ International industrial technology development work
      ⑧ Subsidy for R&D cooperation work, including multi-industrial use of tropical resources
4. Preparation of base for technological R&D
   (1) Expenses for Agency of Industrial Science and Technology
      ① R&D of next-generation industrial technology
      ② R&D of new energy technology
      ③ R&D of energy conservation technology
      ④ Aid for development of oil substitute energy
      ⑤ R&D of large industrial technology
      ⑥ Expenses for essential R&D
         (i) Aid for development of essential technology
      ⑦ R&D of essential region technology
      ⑧ Expenses necessary for industrial standardization
      ⑨ Expenses necessary for special research by laboratories
   (2) Patent rights and industrial ownership rights
      ① Mechanization of application work, etc
      ② Rationalization of application, etc
      ③ Internationalization
      ④ Issuance of official patent rights information
   (3) Expenses necessary for industrial standardization
   (4) Improvement in quality and design of products

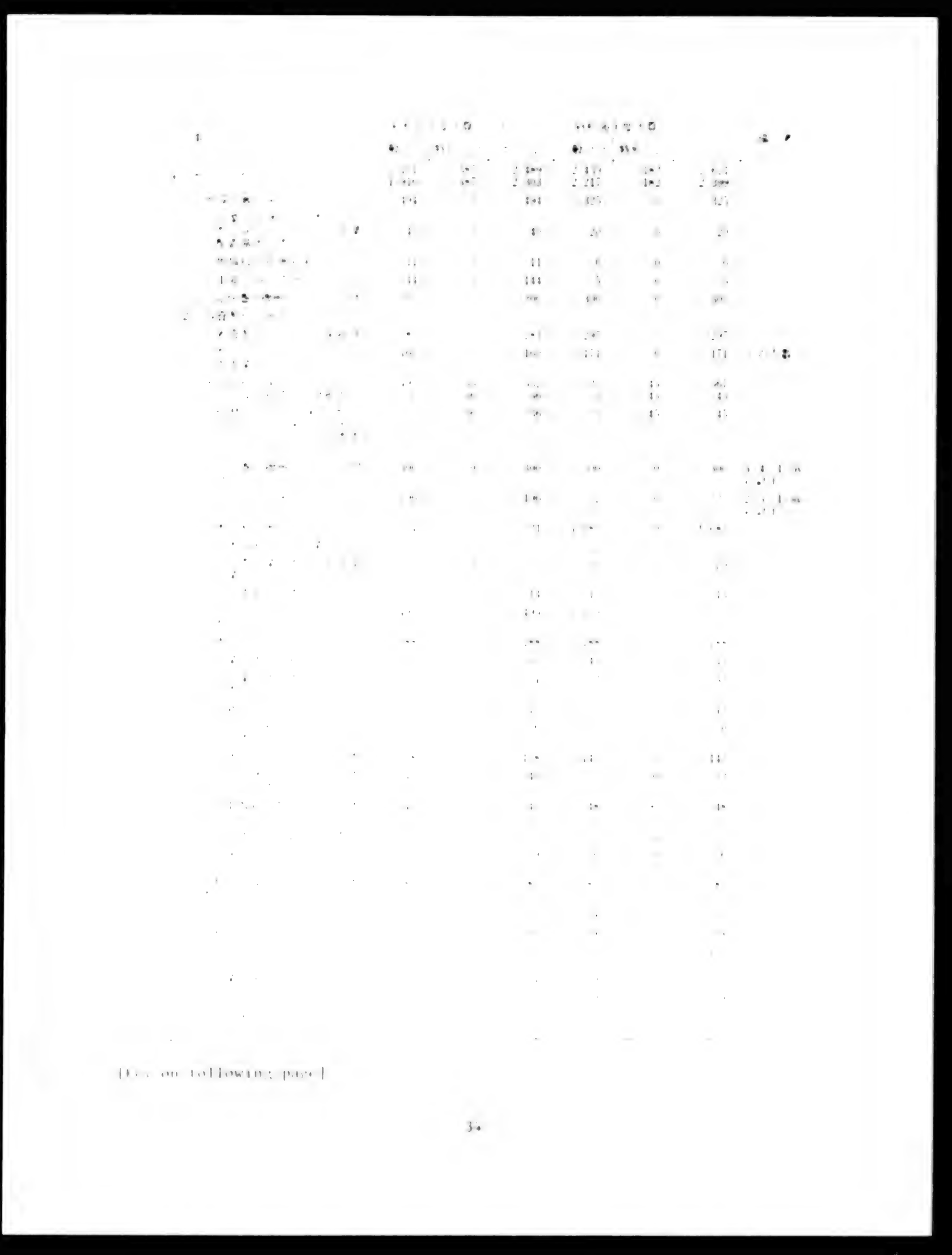
[Table 4 continued on following page]



Key:

5. For other social needs
   (1) Improvement of technical knowhow of smaller enterprises
      ① Technical guidance
         (i) Subsidy for technical guidance facilities
         (ii) Subsidy for technical guidance work
         (iii) Promotion of technical guidance work
      ② Technical development work
         (i) R&D by national establishments
         (ii) Subsidy for technical development study
         (iii) Technical development work
      ③ Technical research work
         (i) Subsidy for technical improvement cost
         (ii) Technical research promotion work
      ④ Training of technicians
         (i) Subsidy for training of technicians
      ⑤ Technical development projects of Small Business Promotion Corporation
         (i) General technical development work
         (ii) Energy technology development work
      ⑥ Technology transfer and exchange work
      ⑦ Information system usage
      ⑧ Smaller enterprise oil substitute energy technology development
   (2) Medical-Welfare Equipment
      ① R&D of machine technology for medical and welfare purposes
      ② Development of mechanical system for residential areas
      ③ Development of health care network system
   (3) Environmental safety, security and disaster prevention
      ① Environmental safety
         (i) Comprehensive study on industrial pollution
         (ii) Development of method to study industrial pollution
         (iii) Study of mining pollution prevention technology
         (iv) Safety of chemical substances
         (v) Environmental and resource conservation measures for chemical products
         (vi) Internationalization of information and study of safety of chemical matters
      ② Measures for earthquake disaster and assurance of industrial protection
         (i) Industrial earthquake measures
         (ii) Earthquake proofing of high pressure gas plant
         (iii) Disaster prevention assessment
         (iv) Basic study of establishment of gas work facilities
         (v) Technical study of mining safety

[Table 3 continued on following page]



[Text on following page.]

(4) Others

① Regional advancement

(i) Study of appropriateness of industrial sites

Including ⓐ Basic study of Technopolis industrial site

(ii) Advancement of regional technology

(iii) R&D of essential regional technology

(iv) Development of residential mechanical system

② Reuse of resources

(i) Resource conservation and resource recycling measures

Including ⓐ Establishment of testing plant

③ Development of social system and technology for people's welfare

(i) Contract out for study on community energy system using substitute energy

(ii) Development of residential mechanical system

(iii) Development of health care network system

④ Strengthening functions of Japan External Trade Organization

(i) Operation of ITIRO

ⓐ International industrial technology development work

ⓑ Study of technology trend

(ii) Participation in international energy exhibition (fair)

⑤ Water producing measures

(i) Study of reuse of industrial water waste

ⓐ Study of quality and application of waste water

ⓑ Study of miscellaneous use and irrigation

ⓒ Study for formulation of technical guide for use of sewage water

(ii) Study of development of desalinization of sea water

ⓐ Developmental study on desalinization technology using reverse permeation system

ⓑ Developmental study on desalinization technology using hot-cold LNG

ⓒ Study for formulation of guidance for water producing facilities

ⓓ For management of Chigasaki coastal research facility

⑥ Contract out for study of development of mineral resource prob... technology

⑦ Improvement of housing

(i) New housing development

(ii) Contract out for development of housing using natural energy

⑧ Leather mining

(i) Leather making technology

(ii) Prevention of leather industrial-pollution

(iii) For ... industrial technology

Solar	Hitachi City, Osaka (res. individual) Ikoma City, Kanagawa (housing, individual) Mitaka City, Tokyo (data center building) Chiyoda City, Tokyo (business project)	Operational test of four demonstration systems used on new and existing houses, large buildings and housing project completed in FY-81
Industrial use solar system	Ichinomiya, Aichi Hanagashima, Miyazaki	Expect to start construction in FY-82
Solar energy power plant	Nio-machi, Kagawa	Operational study of two systems of 1,000 kW solar energy power plant has been carried out since latter half of FY-81
Solar power generation system (manufacturing system)	Naoetsu, Niigata Hitachi, Ibaraki Kawasaki, Kanagawa Amagasaki and Himeji, Hyogo; Shinjo, Nara	Started in FY-81
Solar power generation system (system using solar power generation)	Yokosuka, Kanagawa (individual home); Tenri, Nara (housing project), Tsukuba, Ibaraki (school) Hamamatsu, Shizuoka (plant)	Started building various systems in FY-81
Solar power generation system (collector type solar power generation system)	Ichihara, Chiba (dispersed type) Saijo, Ehime (collective type)	Construction started in FY-81

(Table continued on following page)

Hot water power plant (binary flow system)	Akinomiya, Akita	Operational test being conducted within the plant since FY-81; expect to start construction of 300 kW plant at site in FY-82
Deep strata hot water power system	Yuwa-machi and Kawabe-machi in Akita	Four 1,000 meter drilling and construction projects of a system started in FY-80; expect to complete during FY-83
Survey of geothermal probe technology, etc	Sengan, Akita-Iwate Kurigoma, Miyagi	Survey at sites has been going on since FY-80 (completion expected in FY-83)
Survey on environmental safety at large-scale deep geothermal plant	Iwayoge, Oita-Kumamoto	Local survey being conducted since December 1978 (completion expected in FY-83)
Coal Energy		
Lignite coal liquefaction plant	Victoria Province, Australia	50 tons/day capacity coal processing plant under construction since FY-81
Bituminous coal liquefaction plant (solvent extraction method)	Kashima, Ibaraki	Plant capable of processing 1 ton/day started operating in FY-81
Bituminous coal liquefaction plant (Solvolysis method)	Nagasaki City, Nagasaki Hiroshima City, Hiroshima	Plant capable of processing 1 ton/day has been operating since end of FY-77 and another of 0.1 ton/day capacity since FY-80
Medium/low calorie gasification plant using coal	Iwaki City, Fukushima	Plant capable of producing 7,000 cubic meters of gas/day (processing about 20 tons of coal/day under construction since FY-79 (completion expected in FY-81)

(Table continued on following page)

Low calorie gasification plant using coal	Yubari, Hokkaido	Plant capable of processing 5 tons/day of coal started operating in FY-75. Plant capable of processing 40 tons/day started operating in FY-80
Hydrogen Energy		
Hydrogen manufacturing plant using hydroelectrolysis method	Kawasaki, Kanagawa	Operation of plant producing 4 Nm^3/hour completed in December 1981. Plant capable of producing 20 m^3/hour being built since FY-81
Comprehensive Research		
Large wind power plant	Miyakejima, Tokyo	Plant of 100 kW wind power plant being built since FY-81 (completion expected during FY-82)

Table 3. Outline of FY-82 Budget Draft for Sunshine Project (in 1,000,000 yen)

Item	FY-81 Budget	FY-82 Budget	Main items for FY-82
1. Solar energy General Special	7,961 [2,322 [5,639	8,711 [2,120 [6,591	1. Solar heat power plant (2-system 1,000 kW), development of (*1,123-*964) 2. Development of technology for putting solar heat power plant to practical use (*4,300-*5,051) 3. R&D of solar power plant such as amorphous solar cell type (1,551-1,611) 4. Development of industrial solar system (*216-*576)
2. Geothermal energy General Special	9,223 [1,762 [7,461	9,492 [1,501 [7,991	1. Comprehensive survey of geothermal resources throughout Japan (2,629-2,628) (including *2,518-*2,505 for performing survey) 2. Inspection-survey of geothermal drilling technology (at Sengan-Kurigoma districts) (1,587-1,544) (including *1,012-*1,049 for survey) 3. Survey of environmental safety of large-scale geothermal power plant (Toyogoe District) (*2,600-*3,060) 4. Development of deep strata hot water supply system (*678-*692) 5. Development of hot water power plant (*653-*685)

[Table continued on following page]

[illegible]	13,514 [580 [12,934	20,637 [748 [19,889	1. Development of liquefaction plant (lignite liquefaction & bituminous liquefaction) (*7,724-*16,136) (including *3,489-*12,300 for lignite liquefaction) 2. Development of high-caloric gasification plant (7,000 cubic meters/day) (*2,518-*1,303) 3. Development of low-caloric gasification plant (*2,392-*2,450)
4. Hydrogen energy General Special	948 [44 [904	923 [394 [529	1. Development of hydrogen manufacturing plant using electrolysis method *504-*529)
5. Comprehensive study (general) General Special	1,233 [749 [484	1,067 [658 [409	1. Study of sea-thermal power (213-239) 2. Wind power plant (100 kW) development (*484-409)
6. International cooperation General	668 [668	674 [674	1. IEA cooperation (647-653) (including 565-590 for high-temperature rock power system) 2. Japan-Australia cooperation (21-21)
7. Others General Special	112 [107 [5	132 [126 [5	1. Agency expense, research facility expense
Total General Special	33,659 [6,932 [26,727	41,636 [6,222 [35,414	Note: *indicates special accounts to be carried out by New Energy General Development Organ

Table 6. Outline of FY-82 Budget Draft for Moonlight Project

Item	FY-81 Budget	FY-82 Draft	Main items for FY-82
Large-scale energy conservation technology	8,316 [2,120] [6,196]	8,473 [2,018] [6,455]	Government to take charge of large-scale energy technology requiring long period and large sum for R&D; civilian and academic brains to be mustered
MHD system	624 [624] [0]	592 [592] [0]	Operational test of MHD Mark II (100 kW) to be conducted and essential study made of protective substance in power generation
High efficiency gas turbine	5,920 [970] [4,949]	6,035 [896] [5,139]	To complete high efficiency gas turbine pilot plant (100,000 kW, 50% heat efficiency) for operational test; R&D on technology for ultimate prototype plant (heat efficiency of 55%) to be conducted.
New cell power storage system	646 [242] [404]	858 [249] [609]	Test manufacture of 1 kW cell and designing of facility for testing of system
Fuel cell power generation technology	239 [158] [80]	618 [251] [367]	Test manufacture of phosphoric type cell's main body and R&D of essential technology for fused carbonate and solid electrolyte types
Multi-use Sterling engine	-	275 [30] [245]	Conceptual design of Sterling engine R&D of essential technology, etc
Technological system for use of waste heat	887 [125] [762]	95 [0] [95]	Removal of test facility built for R&D

[Table continued on following page]

[illegible] conservation technology	208	195	Continuing and new R&D of "Kalina" turbine and high efficiency CHP heat exchange technologies
International cooperation	16	5	Study of improved heat pump system of IEA
Comprehensive and effective method of grasping energy conservation technology	-	11	Start on technology related tables
Assist private development of energy conservation technology	467	669	Subsidy for R&D of energy conservation technology by private firms, competitive development of electric refrigerator
Standardization of energy conservation	56	49	Study of standardization of energy-conserving materials, industrial furnaces, civilian use machinery and equipment
Study of energy conservation software technology	14	-	Completed in FY-81
Other	86 [75 11]	84 [74 11]	Administrative expenses for R&D
Total	9,163 [2,956 6,207]	9,490 [3,025 6,466]	Note: Figures in [ ]: Upper for general, lower for special accounts; others are all general accounts

BRIEFS

JAPANESE TEST SATELLITE LAUNCHING--Tokyo, 16 Jun (KYODO)--Japan will launch a a technological test satellite on August 24, the government said Wednesday. The launching will take place at the space center on Tanegashima Island, south of Kyushu. The National Space Development Agency will fire a three-stage rocket to put the 385-kilogram satellite, codenamed ETS-3, into a 1,000-kilometer circular orbit, officials said. The agency will test its technology for three axial attitude control which calls for controlling the attitude of a satellite without making it rotate itself, they said. [Text] [OW161045 Tokyo KYODO in English 0956 GMT 16 Jun 82]

CSO: 4120/306

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July 15, 1982